



Complex of High Quality Portable X-Ray Systems

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Abstract: The paper describes the types, advantages and applications of portable x-ray machines. It is shown that the use of advanced technology in the portable X-ray machines DIG-360, POSKOM PXP-60HF and PORX KOREA has led to number of improvements in technical characteristics.

Keywords: x-ray machines, DIG-360, POSKOM PXP-60HF, PORX KOREA, X-ray devices, portable, radiation dose.

Portable systems make it possible to carry out the diagnostic process to identify the disease in any extreme conditions. Due to its light weight and small size, it can be carried by hand, besides, this device allows you to work on a battery. Such medical X-ray devices are 2-3 times cheaper than analog X-ray devices, the amount of radiation dose is 10 times smaller than analog X-ray devices manufactured in France, Korea and China, and the quality of images is much higher [1-5].

Advantages of portable x-ray equipment: it has a collimator with a built-in halogen lamp and an additional pointer to determine the center of the object, and it focuses the x-ray beam to a high level; the result is ready in 3-5 seconds and allows the transfer of images via the Wi-Fi network of the Internet; having a very small radiation dose; Due to its weight up to 18 kg, it can be easily carried by hand, and it allows taking X-ray images even during the operation [1].

Several types of portable X-ray devices:





Figure 1. DIG-360 portable x-ray machine

At the beginning of the 21st century, the DIG-360 portable X-ray machine was created based on innovative technologies. The use of a frequency converter control processor in the DIG-360 device, which is used in medical institutions and special places, ensures high efficiency. The features of the DIG-360 portable X-ray device are as follows: digital LED display; from 6-mode control for processor memory; from the automatic compensator; from a manual remote switch for exposure; from the halogen lamps of the collimator; consists of a tape-scale and a laser pointer for measuring the distance.

Portable X-ray machine DIG-360 is certified in Russia, has certificate of registration and has been on sale since 2006. The complex of the DIG-360 device consists of tripod sections, a tripod with an electric lift that ensures movement along the axis of the monoblock plug. With the help of such a stand, X-ray images can be taken in any position of the patient. The DIG-360 X-ray machine is easily removed from the tripod and can be used without a tripod, which expands the possibilities of its application. The amount of radiation dose is determined by a light collimator [2].

The control panel has two switches for 25 settings:

1. kV switch in the range of $40 \div 100$ kV with 1 kV step
2. mAs switch in the range of $0.4 \div 100$ mAs (milliamperemeter mAs per second).

Also, the control panel is equipped with a key for selecting camera parameters through fixed memory and programming buttons for camera mode, a metal box designed for transporting the device to the base assembly, a network cable; cable with upper X-ray activation button; mobile stand; device passport; includes device handle cover and strap.



Figure 2. POSKOM PXP-60HF portable X-ray machine

The Poscom company continues to develop technologies with the Japanese ACOMA X-ray company, which has 50 years of experience in the production of X-ray diagnostic equipment. The PXP series of portable X-ray machines, manufactured with advanced technologies, are the most compact, lightest and most powerful X-ray machines with acceptable average prices. Each PXP series device has different conveniences and advantages in the places where it can be used, all models are very light, reliable and have excellent features: ultra-light weight and compact size; constant output power that is

not affected by voltage fluctuations; to the new function of remote control; to a flat touch panel and a digital screen; highly focused x-ray beam due to a collimator made of a halogen lamp and a laser pointer that determines the center of the object; consists of a silver case for a peroneska [2-3]. The technical characteristics of the POSKOM PXP-60HF portable X-ray machine are as follows: constant power: (kW) 3.2; maximum power: (kV/mA) for 1 kV in the range of 100/60 kV: in the range of 40-100 mAs: 0.4-100/25; focus (mm): 2.0; collimator lamp: 150W/24V; SID scale: 2M; laser pointer: built-in; power: AC 220-240V; phase, frequency: APR 8; weight (kg): 13 consists.



Figure 3. PORX KOREA (ID: 12835) is a portable dental X-ray machine

Specifications of PORX KOREA (ID: 12835) portable dental X-ray machine: anode voltage fixation: 60 KV (constant); x-ray tube current: 2mA (constant); tube model D-045 (Toshiba); focal spot 0.8*0.8 mm; high voltage generating circuit - high frequency conversion method; cooling system: oil; angle of incidence 20; exposure time: 0.01-1.6 seconds (with a step of 0.01 seconds); total filtration 1.6 mm Al (internal filtration: 0.8 mm AL, added filtration 0.8 mm ALfixed); LCD display; x-ray radiation control using a microprocessor; mains voltage: 110v/240v 50Hz \pm 10% DC25.2V 0.75A; lithium-polymer battery DC24V; size: 180 (W) * 73 (D) * 138 (H) mm; weight: 2 kg [2-3].

The PORX portable x-ray machine is a modern, compact high-frequency dental x-ray machine with a voltage of 60 kV and a tube current of 2 mA, a device designed for taking high-quality diagnostic x-ray images using a digital visiograph or on film. The imaging process can be performed by holding the device by hand, by attaching it to a bracket or fixture.

This device can be used both in the clinic and in a portable position, and it can take high-quality dental X-rays while using very low doses of X-rays. At the same time, PORX has a price 30-50% lower than well-known European brands, and is absolutely not inferior to them in terms of image quality and safety. Other technical features of this device: - During irradiation, the operating parameters of X-ray devices are precisely regulated and controlled by a microprocessor and a special microcircuit; - On-screen self-diagnosis function and control panel with output code indicate that an error has occurred; - The result of the use of the latest technologies in the architecture of the PORX X-ray unit is the small size and weight of the device; - The X-ray machine has a specially designed high-efficiency internal shielding system that provides reliable protection of the operator from radiation; - The quick programming process of time exposure reduces the setup time and ensures fast operation of the device; - Manually adjust exposure in 0.01 second increments using up and down arrow keys

All this allows the employees of the dental clinic to work comfortably and safely, as well as to facilitate diagnostic work with the patient. In the compact ergonomic body of the PORX digital dental

X-ray device, the designers managed to place a high-tech device that provides comfortable working conditions for the dentist while working with dental film and various types of digital radiovisiographs.

Liquid crystal display with bright illumination provides the staff with complete information about the operation mode of the dental X-ray machine and allows you to literally set the machine to the desired operation mode with one push of the buttons. A miniature and powerful lithium-polymer battery allows the device to take more than 200 images on a single charge. The system of constructive protective measures ensures a narrow focus of the generated X-ray radiation, which minimizes the requirements for individual protection of the doctor and the patient and, accordingly, reduces the amount of radiation dose to them.

Advantages of PORX portable X-ray machine: high-frequency working principle; no special protection is required because a lead mask and an aluminum filter are installed to protect against radiation; the application process is easy and convenient; compatibility with all types of visiographs and dental films; is the possession of high-performance battery [1-5].

Conclusion: The use of advanced technologies in portable X-ray devices DIG-360, POSKOM PXP-60HF and PORX KOREA has led to an increase in several technical characteristics and compactness of their appearance.

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